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Orbital Surveys of Solar Stimulated Luminescence

W. R. Hemphill[1/], A. F. Theisen[2/], R. M. Tyson[2/], and J. S. Granata[2/]

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ABSTRACT

The Fraunhofer line discriminator (FLD) is an electro-optical device for imaging natural and man-made materials which have been stimulated to luminescence by the Sun. An airborne FLD has been used to detect geochemically stressed vegetation, drought stressed agricultural crops, industrial and residential pollution effluents, marine oil seeps, phosphate rock, uranium bearing sandstone, and bioluminescent ocean plankton. Three-dimensional perspective plots of excitation and emission spectra measured with a laboratory spectrometer graphically depict similarities and differences in luminescence properties between sample materials. The laboratory data also include luminescence intensities at six Fraunhofer lines in the visible and near infrared regions of the electromagnetic spectrum. Both the airborne and laboratory data suggest the feasibility of delineating and monitoring at least some of these luminescing materials from orbital altitude, such as a test flight aboard the space shuttle using an improved "third-generation" FLD.

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